CLAIMS

1. A weldable fastener comprising:

a fastener head having a first head thickness; and

an annular weldment area having a second head thickness, said second head thickness being less than the first head thickness.

2. The weldable fastener according to Claim 1 wherein said head has an exterior wall having a first exterior radius and said annular weldment area has a second exterior radius equal to the first exterior radius.

3. The weldable fastener according to Claim 1 further comprising a threaded shank.

4. The weldable fastener according to Claim 3 wherein said shank comprises a weakened section position adjacent to said head.

5. The weldable fastener according to Claim 1 wherein the second head thickness is about 20% to about 35% of the first thickness.

6. The weldable fastener according to Claim 1 wherein the first head thickness is greater than 1.5 mm.

7. The weldable fastener according to Claim 1 wherein the first head thickness is greater than 2.0 mm.

8. A stud to structure construction comprising:

a weldable fastener having a member with a first thickness and an annular weldment area having a second thickness which is less than the first thickness; and

an annular weldment disposed between and coupling the weldable fastener to the structure.

9. The stud to structure construction according to Claim 8 further comprising a threaded shank coupled to the member.

10. The stud to structure construction according to Claim 9 wherein the member comprises a web portion.

11. The stud to structure construction according to Claim 10 configured such that the shank has a first failure load, and the web has a second failure load greater than the first failure load.

12. The stud to structure construction according to Claim 11 wherein the annular weldment has a third failure load greater than the first failure load.

13. The stud to structure construction according to Claim 11 further comprising a nut configured to fracture at a fourth failure load, said fourth failure load being less than the third failure load.

14. The stud to structure construction according to Claim 10 wherein the structure is a metal laminate.

15. The stud to structure construction according to Claim 14 wherein the metal laminate comprises a polymer layer.

16. The stud to structure construction according to Claim 15 wherein the laminate comprises first and second metallic layers, said polymer layer being disposed between the first and second layers.

17. The stud to structure construction according to Claim 14 wherein the weldment area is partially disposed between the first and second metallic layers.

18. The stud to structure construction according to Claim 14 wherein the polymer layer within the annular weldment area couples the first and second metallic layers.

19. A method of coupling a threaded shank to a structure comprising:

providing a head coupled to the threaded shank, said head having a first thickness and an annular weldment portion, said annular weldment portion having a second thickness less than the first thickness;

positioning the annular weldment portion so as to contact the structure;

loading the annular weldment portion with an electric current;

withdrawing the annular weldment portion from the structure to form an arc to create molten metal; and

plunging the head into the molten metal to form a stud to structure interface.

20. The method according to Claim 19 wherein providing a head is providing an annular weldment portion having a thickness of about 20% to about 35% of the first thickness.

21. The method according to Claim 19 wherein loading the weldment portion with an electric current is loading the weldment portion with less than 950 amps.

22. The method according to Claim 19 wherein withdrawing the head is withdrawing the head for greater than 50 milliseconds.

23. A weld stud comprising:

a longitudinally elongated shank;

a laterally enlarged head extending from an end of the shank; and

a substantially annular section longitudinally extending from the head opposite the shank; and

wherein a welding edge of the annular section is substantially flat along a lateral plane substantially parallel to a lateral plane of the head, prior to welding.

24. A weld stud according to Claim 23 wherein the head has a first thickness, and the annular section has a second thickness, said second thickness being less than the first thickness.

25. The weldable fastener according to Claim 23 wherein said head has an exterior wall having a first exterior radius and said annular weldment area has a second exterior radius equal to the first exterior radius.

26. The weldable fastener according to Claim 23 wherein the elongated shank is a threaded shank.

27. The weldable fastener according to Claim 23 wherein said shank comprises a weakened section position adjacent to said head.

28. The weldable fastener according to Claim 24 wherein the second thickness is about 20% to about 35% of the first thickness.

29. The weldable fastener according to Claim 24 wherein the first thickness is greater than 1.5 mm.

30. The weldable fastener according to Claim 24 wherein the first thickness is greater than 2.0 mm.

31. An automotive vehicle apparatus comprising:

a laminate panel; and

a ring stud arc welded to the laminate panel, wherein the ring stud is welded to the laminate panel by an annular weldment area.

32. The automotive vehicle apparatus of Claim 31 wherein the a ring stud has a head with a first thickness and an annular weldment area having a second thickness which is less than the first thickness.

33. The automotive vehicle apparatus of Claim 31 wherein the ring stud comprises a threaded shank coupled to a head.

34. The automotive vehicle apparatus of Claim 32 wherein the head comprises a web portion.

35. The automotive vehicle apparatus of Claim 34 configured such that the shank has a first failure load, and the web has a second failure load greater than the first failure load.

36. The automotive vehicle apparatus of Claim 34 wherein the annular weldment has a third failure load greater than the first failure load.

37. The automotive vehicle apparatus of Claim 31 wherein the laminate panel is a metal laminate.

38. The automotive vehicle apparatus of Claim 37 wherein the metal laminate comprises a polymer layer.

39. The automotive vehicle apparatus of Claim 38 wherein the laminate comprises first and second metallic layers, said polymer layer being disposed between the first and second layers.

40. The automotive vehicle apparatus of Claim 37 wherein the weldment area is partially disposed between the first and second metallic layers.

41. The automotive vehicle apparatus of Claim 37 wherein the polymer layer within the annular weldment area couples the first and second metallic layers.

42. An automotive vehicle apparatus comprising:

a ring stud arc welded to a laminate panel, wherein the ring stud is welded to the laminate panel by an annular weldment area and wherein the laminate comprises first and second metallic layers, a polymer layer being disposed between the first and second layers.

43. The automotive vehicle apparatus according to Claim 42 wherein the ring stud comprises a threaded shank coupled to the member.

44. The automotive vehicle apparatus according to Claim 43 wherein the ring stud comprises a web portion.

45. The automotive vehicle apparatus according to Claim 44 configured such that the shank has a first failure load, and the web has a second failure load greater than the first failure load.

46. The automotive vehicle apparatus according to Claim 45 wherein the annular weldment has a third failure load greater than the first failure load.

47. The automotive vehicle apparatus according to Claim 45 further comprising a nut configured to fracture at a fourth failure load, said fourth failure load being less than the third failure load.

48. A method of attaching a ring stud to an automotive vehicle panel, the method comprising:

(a) positioning the ring stud to contact the automotive vehicle panel;

(b) conducting an electric current through the ring stud;

(c) retracting the weld stud from the vehicle panel to form an arc and to create molten metal; and

(d) plunging the ring stud into the molten metal.

49. The method according to Claim 48 wherein conducting an electric current through the ring stud is loading a weldment portion of the stud with an electric current less than 950 amps.

50. The method according to Claim 48 wherein the automotive vehicle panel is a metal laminate.

51. The method according to Claim 50 wherein the metal laminate comprises a polymer layer.

52. A method of attaching a ring stud to an automotive vehicle panel, the method comprising:

(a) automatically locating the ring stud adjacent the vehicle panel;

(b) creating an electrical arc between the ring stud and the vehicle panel; and

(c) welding the ring stud to at least a first metal layer of the vehicle panel while at least partially displacing a polymeric layer of the vehicle panel adjacent the welding area.